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POPULAR MISCONCEPTIONS CONCERNING NATURAL HISTORY

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THERE is in the popular mind a surprisingly large store of misinformation and misconceptions concerning many forms of natural history. They concern not only exotic and the less well-known plants and animals, but our commonest forms share prominently in these misbeliefs in spite of the large amount of published information on natural history and opportunities for individual observation. To err is human and all classes share to a greater or lesser extent in errors of judgment and observation. But there is a large class of traditional errors that have become more or less fixed, some locally, others nationally. It is this class, a part of our folk lore, which has been perpetuated in many cases in books, magazines, newspapers and traditions with which this article will deal. It is perhaps impossible to find the origin and to trace the development of our common natural history misconceptions. It is possible by an analysis of some of our most widely known ones to assign probable explanations of their origin and by the application of certain well-known principles of human psychology to understand their perpetuation.

It should be mentioned first that the perpetuation of our traditional natural history misconceptions is made possible largely by the fact that a considerable portion of the people do little or no reading. There is also a class which reads for thrills and not for information, that may be included with the above. There is in print enough accurate information to set at naught most or perhaps all of what is commonly termed popular misconceptions. It appears that prevalence of natural-history superstitions and misinformation in countries and communities is in inverse ratio to the amount of reading done. It is perhaps true that the country people perpetuate more of this misinformation than do city people, though the difference is not so great as is generally thought.

It has been frequently stated that human nature is inherently lazy. One apparent manifestation of this is that many individuals prefer to take another's explanation of some phe-

nomenon rather than to secure the information for themselves. This is of course not a characteristic of the untutored mind alone, but college students very commonly follow this line of least resistance. This fact makes possible the perpetuation of gross inaccuracies. It is commonly stated that the earthworms seen so often crawling about after a hard rain have fallen with the rain. An observation requiring only a few minutes would reveal the holes in the water-soaked earth through which they have emerged and perhaps a few in the act of emerging.

The statements of the more prominent people in the community are more likely to go unchallenged than those from the less well known. This prevails among all classes. A very prominent early worker in entomology figured grasshoppers laying eggs in an impossible position fifty years ago. This figure has been widely copied and accepted without question until a few years ago, when it was disproven. It would have been an easy matter to check up this observation had not the prominence of the early worker given added confidence to the earlier conclusions. There are no doubt, many errors in scientific writings perpetuated because of the prominence of the writer, whereas the unknown scientist might be quickly doubted.

An acceptance of the opinions of others is most frequent when individual observations are difficult or impossible. The group of misconceptions arising in this connection is naturally a large one, since superstition, hearsay and exaggeration play important parts. It is impossible for the rank and file to follow the latest scientific discoveries explaining even most familiar phenomena, much less to investigate for themselves. Consider the following in this connection. It is quite generally believed that flies are able to walk upside down because they have suckers on their feet. This is an old idea which has persisted, largely in the popular mind, though it has long been known that there is a secretion of adhesive material from minute glands on each tarsal pad which enables the insect to literally glue itself to its sub-stratum. Again, animate objects that glow or glisten are generally said to possess phosphorescence. The best known instance is that of the lightning bugs or fire flies which are often seen by the thousands on a warm summer's evening. Recent studies apparently find no basis for this belief, but explain the light as due to rapid oxidation of certain cell substances. Less frequent perhaps is the belief that the glistening of the cat's eyes in the dark is due also to phosphorescence, when the true explanation is said to be the reflection of entering light by the tapetum, a thin membrane

covering the retina. Quite general is the belief that mad dogs foam at the mouth; in fact this is thought to be the one thing to look for when a mad dog is suspected. Published observations indicate that foaming at the mouth is not present in all cases and when present is not the first manifestation of hydrophobia. The streaks of light so often seen in summer in the west below the sun is explained as the sun drawing water. At times, it is commonly thought the sun draws with such force that the earthworms, frogs, snakes and even fish are drawn up to be dropped with the next shower.

Perhaps the majority of misconceptions concerning natural history are based on mistaken observations and misinterpretation of the facts involved. Many people arrive at conclusions quickly and an explanation that appears plausible to one is likely to appeal to others. Such misconceptions arise from new sources constantly. A beaver's tail, for example, suggests a trowel, especially when considered in connection with its houses. It is not surprising that there has arisen a persistent misconception sometimes seen in school texts that the beaver's tail is used as a trowel. Seton finds no evidence whatsoever to substantiate this belief. Its front legs and chin are its chief tools in building operations, while the tail serves chiefly as a propelling and guiding force while swimming and to "slap" the water as a signal to its associates. The beaver is said to drive stakes or piles in the mud of streams, another fallacy based on a superficial observation of the sticks and not a study of the animal. The porcupine is said to shoot its quills at its enemies because possibly of the superficial resemblance of the quills to arrows. Indeed, when a dog attacks a porcupine he invariably comes off with some quills in his flesh, which is accepted as further proof that they were shot like arrows at him. It is of course impossible for this animal to protect himself in this manner, there being no muscular or other arrangement to effect it. The quills are very loosely attached, therefore easily dislodged. They are also very sharp and readily puncture the flesh of its captor.

Some misconceptions of this class have been given prominence and perpetuated by incorporating them in the common names of the animals themselves. Flying squirrels and flying fish are familiar subjects of natural history, yet neither actually fly. The so-called flying squirrels are gliders or parachuting animals only, inasmuch as they can only descend from a higher place to a lower, using the extended skin between the fore and hind legs in the same way as a parachute is used. The so-

called flying fish appear superficially to be true flying animals for the enlarged pectoral fins suggest the wings of a bird. Yet there is no doubt that they use these fins as planes for gliding only. The propelling force is the tail which supplies the momentum before the fish leaves the water. The longest glides are made against the wind. There is no suitable musculature to effect a flapping movement. There are many available illustrations among insects where the common names involve an error of some kind. Popularly speaking, all insects are bugs when, strictly speaking, this name applies only to one order of sucking insects (Hemiptera). The larvæ of some insects are called worms when this name is more properly applied to members of the *phylum annulata*, of which the earth worm is a type. Clothing, carpets, etc., are said to be attacked by the clothes moths, yet in no case is the injury done by the moths, but by the larvæ of the moths, the former feeding on nectar or pollen and being quite harmless. The buffalo bug is not a bug but a beetle; the pear slug is not a slug, but a slug-like larva of a true insect; the sheep tick is not a tick, but a fly, etc.

It appears further that of all animals, there are more misconceptions concerning the ugly and disliked ones than others. The skunk, weasel, toad, snakes and spiders are not general favorites with the people at large; in fact they are shunned and even a distant acquaintance is abhorred. The less known about an animal, the more readily will hearsay, mistaken ideas and imaginative tales be believed. Snakes are perhaps the most widely feared and despised of all creatures. It is not surprising, therefore, that we have such fantastic stories as the hoop snake, the glass snake, the monster sea serpents, mother snakes swallowing their young in the presence of danger, not to mention the mythical scaly monsters that exhaled smoke and fire. The snake charmer makes a living by taking advantage of the lack of true information about these much abhorred creatures as well as of various superstitions and misconceptions concerning them. No circus would be complete without its dangerous snake, the largest in captivity. It is quite generally believed that all snakes and spiders are poisonous and their bites would prove fatal, when authentic accounts say there are many of both that are wholly harmless. Snakes are said to be deaf, and only last year this misconception appeared in prominent head lines on a page about snakes in a leading Sunday paper. True, there is no external ear present, but there is nevertheless a pair of ears and the old adage "as deaf as an adder" is no longer expressive. Rattlesnakes are supposed always to rattle before

striking, a kind of gentlemanly sportsmanship to warn the victim that he still has a chance. Observations recorded appear to show that the rattlesnake may forget this chivalrous act and strike without warning. The writer believed throughout youth that when a snake was killed, its tail would not die until sun down. This misconception has been met with among youths of three widely separated localities. The brain of snakes is small, consequently some powers held by the brain in certain other animals are delegated to the spinal ganglia in the snake, therefore crushing or severing the head of the snake does not remove the possibility of body movements from impulses emanating from these ganglia. Perhaps some one disliking cats started the revolting story that if a cat was left alone with an infant, it would kill the child by sucking its breath. This impossible thing is quite generally believed, though without basis of facts.

Then there is another prominent group of misconceptions bearing little semblance of truth whose origin is perhaps the work of a fertile imagination. Consider, for example, the well-known belief that a horse hair will turn to a snake. It must be a hair pulled out by the roots from either the mane or tail and kept in quiet water, we are told, and in due time it will be a snake. Thus *Gordius* and other closely related round worms which are about the same size as horse hairs are supposed to come into existence. Of course no one has even been able to effect this transformation, because he failed to follow directions carefully. The earwigs (*Forficulidæ*), relatively common insects in Europe, are so named because they are supposed to puncture people's ears. This reminds us somewhat of the very general belief in the United States that dragon flies sew up the ears of bad boys with their long abdomens which superficially suggest a stout needle. But one of the best examples of this class is the well-known supposed performance of the "doodle bugs," more properly known as ant lion larvæ (*Myrmeleonidæ*). These larvæ make little pits in sandy places and wait concealed, except for the protruding jaws at the bottom of the pit, for ants. The story goes that when a pit is found, if one repeats the following couplet, the hidden larva will immediately leave its pit and pass in review before the observer. One version is, "doodle bug, doodle bug, fly away home; your house is on fire your children will burn." There are various modifications of this charm in different localities. This is one of very few instances where a lowly insect is credited with "knowing" its name.

There is a difference in the misconceptions about objects of

natural history in different localities thus introducing some interesting variations. The writer had this forcibly brought out in several communities by the various popular rules to follow for determining which mushrooms were edible and which were poisonous. In one community, those that were pink underneath were regarded as edible by some collectors, in another community these were discarded as poisonous. The same divergence of opinion was observed with the rule that if they would peel they were edible and with those growing on wood. In one community to find water with a forked stick, a peach twig had to be used, elsewhere cherry or willow was always used. One finds a host of examples of local differences in superstitions. In some homes the chirp of a cricket in the house is regarded as a "good sign," in others foretelling disaster. Likewise the screech owl in some communities is supposed to foretell by its plaintive song evil happenings, at other places, announcing good news. In some communities killing a toad will cause all the cows in the neighborhood to give bloody milk, elsewhere robbing a robin's nest will effect the same result according to the superstitious folk. The crowing of the cock before midnight is in some places the herald of rain the next day, elsewhere it merely announces a visitor.

The chief importance of a consideration of these and other misconceptions of natural science, excluding the student of folklore, is their effect on the youth. These mistaken ideas become fixed in the minds of children, perhaps when very young, and will persist until corrected. Classes of fifth-grade children in the public schools of Milwaukee invariably stated that the ostrich in the presence of danger buried his head in the sand, and immediately felt safe, on the principle that if he could see no danger there was no danger. Perhaps seventy-five per cent. would uphold this idea. This explanation has persisted with the public generally and can be found in many books at the present time, notwithstanding reliable observers report this to be fallacious. In the writer's community it was almost universally believed that dragon flies were snake doctors whose chief duty it was to heal sick and wounded snakes. This supposed duty was the source of considerable prejudice against these beneficial creatures, and we therefore killed them at every opportunity. Likewise the barn swallow was killed and its nests destroyed whenever possible, for it was supposed to carry bed bugs.

Children are told these things by parents, servants, playmates or neighbors and in rare cases in the elementary schools.

Their confidence in these people causes them to believe them unreservedly. In many homes, especially where little attention has been given to scientific facts, boys and girls gather together a surprisingly large store of mistaken ideas and misconceptions about natural history before reaching school age. This fact is all the more significant when we recall that, for most of us, it requires more effort to correct a mistaken idea than to learn a new one. The daily and Sunday newspapers have a share of the responsibility for some of the misconception in this connection. In their effort to present the unusual and supposed revolutionizing discoveries, the truth is sometimes handled recklessly. Furthermore, purported scientific observations made by correspondents and others are often misleading. Aside from the uselessness and burden of mistaken information, there is an important practical and economic aspect to this subject. The individual may be made to fear or despise a truly beneficial creature and to kill it at every opportunity for reasons based on errors. Which creatures are beneficial to man and which are harmful are, after all, too important considerations to be based on errors.

Let these truths be added arguments for the serious and efficient teaching of nature study in the public schools, for if popular misinformation about well-known objects of natural history is ever corrected, it will be largely through the initiative and intelligent direction of the schools.